F S0030-Field

0052018

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: 300-FF-2
TSD: 618 BG / 316-4
ERA: WELL 699-S6-E4A
Subject Code: 8660

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

OCT 1996

TO: L C Hulstrom H9-11

DATE: October 7, 1996

COPIES: J A Lerch
T D Lefrancois
I D Jacques

FROM: R G McCain
Env Svcs / OSM Team
H9-10 / 372-9593

SUBJECT: FIELD SCREENING RESULTS FOR ORGANIC MATERIAL IN WATER 46827

On September 19 and 27, 1986, water samples were collected from well 699-S6-E4A, located in the vicinity of the 618 burial ground and 316-4 crib, north of the 300 area. Previous experience with this well had indicated that the water may contain an unknown organic substance.

When the well was opened on September 18, an OVM was used to obtain readings of 6.2-6.6 ppm (isobutylene equivalent) in the vapor space inside the casing. A 5-liter Tedlar bag was collected using the OVM as a sample pump and colorimetric tubes were used to attempt to identify the gas, but results were inconclusive.

On September 19, a preliminary water sample was obtained by bailing the well. Approximately 275 ml of this sample was placed in a one pint (473 ml) wide mouth canning jar and tested for volatile organic compounds using an equilibrium headspace method. In this method, the headspace in the jar is circulated through a photoionization detector (PID). Since a PID is essentially non-destructive, the headspace concentration tends to quickly reach an equilibrium value which can be correlated to the concentration of volatile organic compounds (VOCs) in the water. For the September 19 sample, an OVM was used to measure headspace concentrations. Equilibrium headspace values of 3.9-5.0 ppm (isobutylene equivalent) were observed. This result indicated that the water did contain a VOC detectable with a PID, and plans were made to conduct equilibrium headspace measurements as the well was developed in order to monitor the VOC concentration as a function of time and purge volume.

A downhole pump was installed in well 699-S6-E4A, and samples were collected during well development on September 27, 1996. Screening samples were collected at intervals during well development. Equilibrium headspace measurements are shown on Table 1 (attached)

Both a ThermoEnvironmental OVM and a PhotoVac MicroTip (μTIP) were used to make equilibrium headspace measurements on September 27. The μTIP was added to the test in addition to the OVM because experience has shown that it tends to be more sensitive at low VOC concentrations. This was confirmed by the initial results. Unfortunately, the μTIP drew in water after the third sample and was no longer functional. Both OVMs used for the headspace measurements failed to respond to the VOC present in the water. Hence, little useful data on VOC concentration as a function of development time was obtained.

Examination of the water samples did reveal other characteristics of interest. Sample B0J281 was observed to have a pH of 9-10, using pH paper, and the conductivity was 412 μS/cm at 19.5°C. A small amount of Sudan IV was added to this sample and shaken. After centrifuging for 5 min at 2000 rpm, there was no evidence of any nonaqueous phase. Sudan IV is insoluble in water and soluble in most organic compounds. The presence of an organic nonaqueous phase liquid in the water sample would be expected to produce a bright red layer after centrifuging.

Later samples appeared to contain small amounts of a whitish material which tends to settle out. These samples also had an odor which resembled diesel fuel. The whitish material did not show an affinity for Sudan IV. pH of the later samples was also in the range of 9-10.

R G McCain

RGM:rgm

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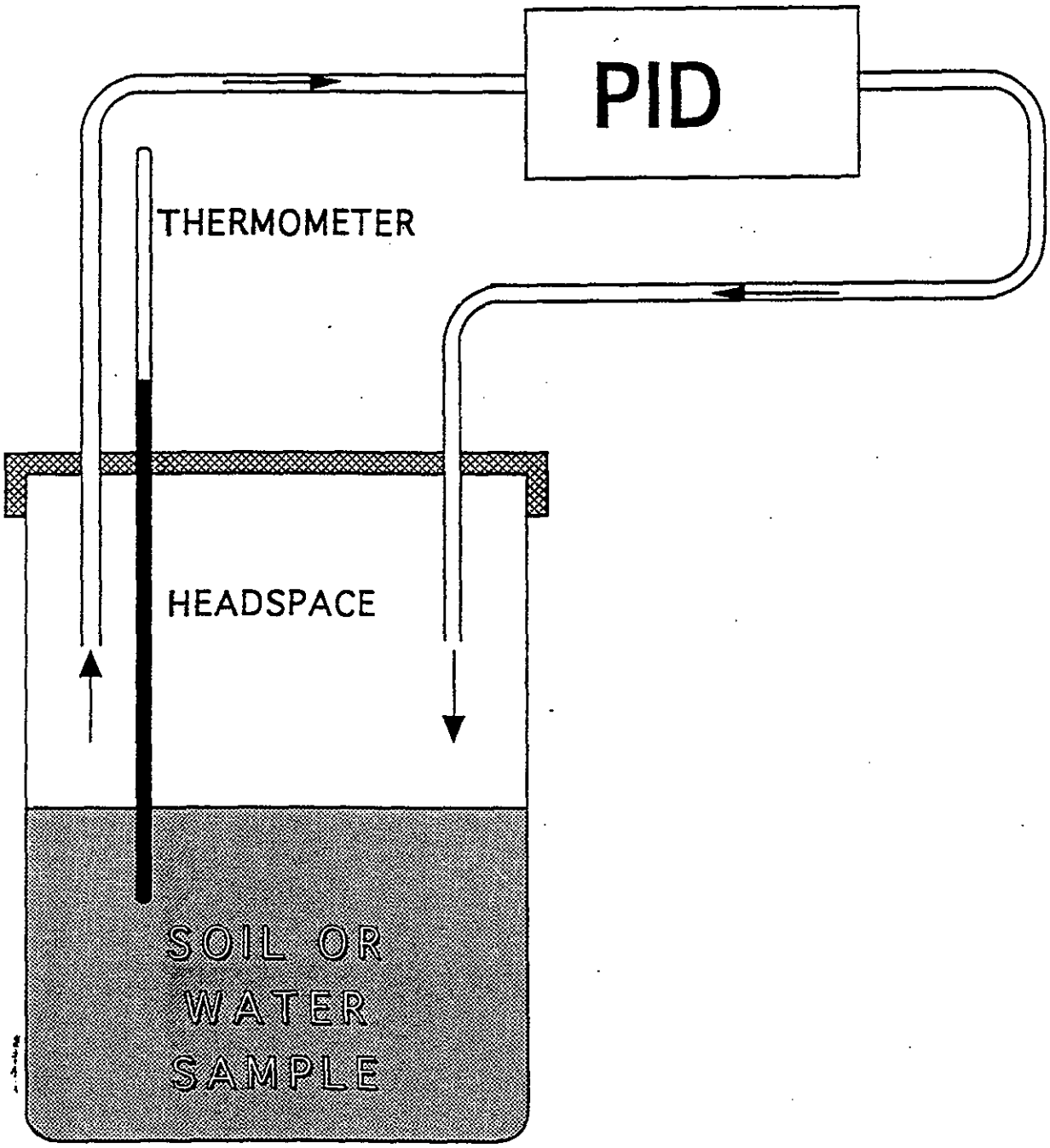
Table 1
Equilibrium Headspace Measurements
Well 699-S6-E4A
September 27, 1996

sample	collection time	analysis time	results
B0J281	0916	0930	3.2 ppm (OVM) / 17.2 ppm (μTIP)
B0J282	0936	1018	4.8 ppm (μTIP)
B0J283	0950	1030	5.3 ppm (μTIP)
B0J284	1005	Unable to obtain further readings due to failure of μTIP (water drawn into detector cell) and lack of sufficient response from OVMs	
B0J285	1035		
B0J286	1105		
B0J287	1135		
B0J288	1205		



GENERAL CONCEPT OF THE EQUILIBRIUM HEADSPACE METHOD

FIELD MONITORING DATA

Page _____ of _____

Instrument Type OVM / Colorimetric Tubes Identifier No. _____ Date 9/18/96

Project Name Well 699-56-E4A Operators Name (Print/Sign) R.G. McCain

Well 699-56-E4A

8.32 On site

Joe Jimenez, site super

8.18 completed pre-job safety & RWP briefing

Kurt Higbee (TMA) is IH rep

OVM w 10.6 eV lamp calibrateed to 97 ppm isobutylene

8.32 ready to uncap well
8.37 OVM under cap: no reading
8.38 uncap well OVM reads 0
8.39 ~ 3ft tygon tubing; OVM reads 1 ppm @ 5 ft
8.40 collecting Tedlar bag from tubing ~5 ft down well casing
8.41 OVM = 3.2-3.6
8.42 OVM = 4-4.9
8.42 OVM = 5.3
8.44 OVM = 5.3-5.7
8.44 OVM = 6.2
8.46 OVM = 5.7-6.2
8.46 OVM = 6.2-6.6
8.48 OVM = 6.2-6.6
8.50 OVM = 6.2-6.6
8.53 OVM = 6.2-6.6
8.55 OVM = 6.2-6.6
8.56 stop collecting bag
8.57 OVM = 6.6 @ ~3ft
8.58 OVM = 4 @ surface
8.59 OVM = 3.20
8.59 OVM bkgnd = 1.9-2.3
9.45 leave site; transport Tedlar bag to 100W in mobile lab

11.28 calibrate OVM (10.6 eV lamp) to 100 ppm isobutene
11.28 10 ppm isobutene = 9.8-10.9 ppm
11.30 bkgnd w needle on OVM is 0.5 ppm
11.33 10 ppm isobutene reads 6.8 ppm thru septum
11.35 unknown reads 0.5-1.5 ppm on OVM
11.42 Sensidyne Polytec (Exp9405): psble slight stain 1st 1-2 mm
11.52 Draeger Polytest; (Exp9412) slt ring stain 2mm to 4mm lt brn
12.09 Sensidyne ethyl acetate (Exp9309): no stain
12.22 Draeger methyl bromide (Exp9410): no stain
12.31 Draeger polytest (Exp9412) w slt ring stain
12.33 connect OVM to bag: 0.5-1.5 ppm
12.38 OVM to 10 ppm isobutene in bag: 8.8 ppm
12.42 Draeger acetone (Exp9209) no stain
12.52 Sensidyne stoddard solvent (Exp9409) no stain
13.03 Sample expended, unable to make any determination, probably because colorimetric tubes are too far out of date

DISTRIBUTION: White - Field File Custodian Yellow - Equipment Field Files Pink - Project Files BC-6000-795 (04/92)

FIELD MONITORING DATA

Page _____ of _____

Instrument Type OVM, Equilibrium Headspace Identifier No. _____ Date 9/19/96

Project Name Well 699-56-E4A Operators Name (Print/Sign) R.G. McLain

96-09-19

699-56-E4A Well

On site @ 16.00

Dave St John & Doug Bryant are samplers
Kurt Higbee if SSO

Plan is to collect samples from the well with a bailer immediately after perforation. Asked Dave to fill a 1-pint Mason jar ~ 1/2 full, in addition to other samples shown on SAF

set up OVM for equilibrium headspace measurements using 1-pint Mason jars

16.39 Cal OVM to 100 ppm isobutene

16.41 10 ppm isobutene reads 9.6 ppm in headspace setup

17.20 began sample collection

droped bailers approx 2 ft about 5 times
OVM reads 1.6 ppm @ top of casing
observed sheen on water surface
water is a light dirty brown

17.46 received sample

water is light brown, cloudy, has small silt-size particles only
rust scale

17.48 start autolog mode on OVM 5 sec intervals

17.49 OVM reads 0.5 ppm on empty jar

17.51 OVM = 3.7 - 5.3 ppm on sample temp = 21 deg C

17.54 OVM reads 0.5 - 1.1 over DI water

17.56 OVM = 2.7 ppm over sample

18.07 turnoff autolog

18.07 add small qty Sudan IV dye to ~ 25 ml water. Shake & centrifuge 2000 rpm for 5 min Dye is undissolved; no non aqueous organic phase present

18.50 received sample B0J202 2 500 ml amber pp glass + 1 500 ml amber pp glass + HNO3 + 1 40 ml VOA vial

FIELD MONITORING DATA

Instrument Type ____________________ Identifier No. __________ Date 9/27/96

Project Name Well 699-S6-E4A

Operators Name (Print/Sign) R.G. McLain [signature]

96-09-27
699-S6-E4A
Well Development Activities
SAF: B96-187

6.30 on site

Doug Bowers & Doug Bryant are samplers; Kurt Higbee is SSO

Procedure for field screening for VOCs (Equilibrium Headspace Method)

1.) Calibrate OVM to 100 ppm isobutene. Set average interval at 1 sec. Set auto-log on, with logging interval of 10 sec.

2.) Collect water in pint (475 ml) wide-mouth canning jar. Fill to depth of approximately 2.5 inches - volume of water is about 275 ml (42% headspace volume). Cap with metal canning lid.

3.) Replace the canning lid with the teflon headspace lid. Circulate headspace through the OVM and allow the reading to stabilize. Record the stable reading in ppm.

4.) After positive readings are obtained, remove the jar and allow the OVM to recirculate ambient air until readings have stabilized at or near zero. Place a clean jar on the headspace lid and recirculate to ensure that no organic vapors remain in the headspace apparatus.

Equipment:

OVM#1: U032521 ser# 580B-33558-245 10.6 eV lamp
OVM#2: U035040 ser# 580B-35392-250 10.6 eV lamp
MicroTip HL2000 ser# 9A920275
CGI: GasTech "TraceTector" Ser#DT057

span gas: 100 ppm isobutylene Byrne lot# 3-043 3/1/93
cal gas: 10 ppm isobutylene Byrne lot# 3-047 3/1/93

6.15 calibrate OVM#1, OVM#2, & MicroTip to 100 ppm isobutylene

6.23 check response @ 10 ppm isobutylene
OVM#1 = 12.5 ppm OVM#2 = 10.9-12.0
MicroTip = 10.1-10.2

8.45 check CGI: 100 ppm isobutylene reads 75 ppm

9.15

9.17 Pump on

9.17 sample #1 B0C231 (samplers recorded time @ 9.16

9.20 Kurt Higbee reports no response on either OVM or GasTech

FIELD MONITORING DATA

Instrument Type _____ Identifier No. _____ Date 9/27/96

Project Name Well 699-56-E4A Operators Name (Print/Sign) B.G. McCain

9.21 flow reported at 6.1 gpm

9.29 Blank (DI water) reads 0.3 ppm (17C)

9.30 B0J2S1 reads 2.8-4.0 ppm (18C)

9.34 switch to OVM#1 reads 3.2 ppm (seems more stable) (19C)

9.39 Microtip reads 17.2 ppm (19C)

9.42 rec'd 2nd sample from Doug Bryant B0J282, collected 9.31

9.50 OVM#1 reads 2.3 ppm on ambient air, MicroTip reads 1.1 ppm

10.07 rec'd 3rd sample from Doug Bryant B0J283

10.10 MicroTip reads 1.1 ppm on empty jar

10.12 MicroTip reads 2.0 ppm on DI water

10.14 rec'd 4th sample B0J283

10.18 B0J282 reads 4.8 ppm on microtip

10.25 add 3X el B0J281 to centrifuge tube w 10inch Duda IV, shake for 1 min & centrifuge @ 2000 rpm 10 min. Yields ~1 cm sediment with no evidence of a NAPL.

10.27 MicroTip reads 1.1 ppm on ambient air

10.30 B0J282 reads 5.3 ppm on MicroTip (21C)

10.38 pH of B0J281 is 9-10, conductivity is 412 uS/cm @ 19.5C

10.39 Microtip reads 1.6 ppm.

10.43 fault on Microtip: light intensity low

11.55 10 ppm isobutylene reads 13.2ppm on OVM#2

11.56 unable to get a reading on B0J281 with OVM#2

Unable to get VOC readings with either OVM. MicroTip has drawn in a drop of water and is not functioning. Took Microtip apart & dried out detector assembly, but unable to restore function. Still appears to be arcing inside detector housing.

LC Hulstrom has received preliminary U data from 1 st 3 samples. He has decided to terminate purging and collect samples for offsite analysis. Last screening sample collected at 12.05 Samples (583) delivered to ID Jacques at 13.20 for Uranium analysis by KPA

Further examination of the water reveals the following

FIELD MONITORING DATA

Page _____ of _____

Instrument Type _____ Identifier No. _____ Date 9/19/96

Project Name Well 69956-E4A Operators Name (Print/Sign) R.G. McCain

Samples have a whitish material only slightly denser than water
Later samples have an odor that resembles diesel
The pH of these samples is ~10

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